Its course was east, and it was last noted over Lake Superior on the 27th.

XI.—This storm may be regarded a secondary from the last and was first noted in Utah on the 26th. Its course at the first was to the southeast to Texas and then east-northeast to Newfoundland on the 31st. This storm was of wide extent and was remarkable in that the greatest precipitation in 12 hours was only 0.40, at Sydney, C. B. I., on the 30th.

XII.—This formed in the rear of the last storm and was first noted to the north of Montana on the 29th. It moved to the southeast and on the last day of the month was central in Michigan. As this storm approached the Mississippi Valley a long trough of low pressure was formed extending from Texas to Minnesota. The heaviest rainfall of the month attended this storm, there having fallen 3.24 in 12 hours at Memphis, Tenn., on the 31st.

NORTH ATLANTIC STORMS FOR JANUARY, 1891 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during January, 1891, are shown on Chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Eight storms have been traced for January, 1891, the average number for the corresponding month of the last 8 years being 10. Of the storms traced for the current month 6 were continuations of storms which first appeared over the North American continent, and 2 apparently originated over the western part of the ocean. One storm traversed the ocean from coast to coast. Storms of exceptional seasonal severity were not reported, and the weather was unusually fine over the eastern part of the ocean. A notable feature of the month was the high barometric pressure which prevailed over the eastern part of the ocean from the 12th to 15th, when readings above 31.00 (787) were noted west of the British Isles.

The month opened with a storm central northeast of Newfoundland, in which region it was located December 31st. Passing slowly eastward, attended by fresh to strong gales and pressure falling to about 29.30 (744) on the 2d, this storm reached the 25th meridian on the 4th, after which it apparently dissipated. On the morning of the 3d a storm of considerable strength was central over the Gulf of Saint Lawrence, whence it moved to southeast of Newfoundland by the morning of the 4th with an appreciable loss of energy, after which it apparently dissipated. On the morning of the 5th a storm appeared between Bermuda and the New England coast, with pressure below 29.50 (749) and heavy gales, whence it moved slowly east of north and reached Nova Scotia on the 7th, in which region it apparently disappeared by an increase of pressure. On the 8th a storm appeared off the southwest edge of the Banks of Newfoundland, and thence moved northeastward to the 40th meridian by the 10th, with fresh to strong gales and pressure falling below 29.30 (744), after which it disappeared north of the region of observation, where its presence was indicated by reports of the following date. On the 8th the pressure was low over the British Isles, and a storm was apparently central over or near the Hebrides. On this date a storm moved off the Texas coast over the northwest part of the Gulf of Mexico, and on the 9th was central off the middle Gulf coast. On the 10th a storm was central over the west part of the Gulf of Mexico, whence it moved northeastward and during the 11th advanced over the central valleys to the lower lake region. Severe gales were encountered off the south and middle Atlantic coasts attending the passage of this storm. During the 12th this storm passed over New England and the Canadian Maritime Provinces, with pressure below 28.70 (729) and heavy gales off the coast. At Saint John, N. B., the tide was reported the highest on record; wharves were flooded, warehouses were damaged, and low lands in the rear of the city were submerged. By the 13th this storm had disappeared north of Newfoundland beyond the region of observation. On this date an area of remarkably high pressure occupied the eastern part of the ocean, where readings above 30.80 (782) were reported from the Irish coast to the 25th meridian. By the 14th the pressure in that region had risen above 31.00 (787), and the pressure continued above that point along the 50th parallel between the 10th and 25th meridians during the 15th, after which there was a gradual decrease in pressure until the 20th, and during the remainder of the month the pressure continued low over and near the British Isles.

On the evening of the 15th a storm was central off the middle Gulf coast, and by the evening of the 16th had moved off the south Atlantic coast. By the 17th this storm had advanced off the middle Atlantic coast, and on the 18th was central off the New England coast, whence it passed to the south of Nova Scotia by the 19th, and on the morning of the 20th was southeast of Nova Scotia, with pressure about 29.30 (744) and fresh gales. From that region the storm moved east-northeast and disappeared north of the British Isles after the 23d, attended throughout by fresh to strong gales, and pressure falling to about 29.20 (742) on the 23d. On the 23d a storm which had advanced from the west Gulf, where it was central the evening of the 20th, moved eastward over the Gulf of Saint Lawrence, and by the 24th had advanced to the 40th meridian, with fresh to strong gales, after which it disappeared in the direction of Iceland. On the evening of the 24th a storm of considerable energy which advanced from the west Gulf was central on the North Carolina coast, whence it moved rapidly northeastward, passing south of Nova Scotia during the 25th, crossing Newfoundland during the early part of the 26th, and disappearing in the direction of Iceland after the 27th. This was the most destructive storm of the month along the coast of the United States, the most notable damage being the prostration of telegraph wires. The storm increased in energy as it advanced over the Canadian Maritime Provinces, where the pressure fell below 29.00 (737) at Saint John's, N. F., on the 26th, and the influence of the storm was felt over the middle and eastern parts of the ocean until the close of the month. On the morning of the 30th a storm which had advanced from the Lake region was central north of Nova Scotia, whence it moved over Newfoundland by the morning of the 31st, with pressure below 29.00 (737) and fresh to strong gales.

OCEAN ICE IN JANUARY.

On the 28th 3 large icebergs were reported in N. 46° 30′, W. 52° 46′, and on the 31st patches of soft ice were observed in N. 45° 50′, W. 59° 20′. In January, 1882 to 1888, inclusive, Arctic ice in small quantities was encountered east of Newfoundland, but in no case was it reported south of the 45th parallel. In 1889 no ice was reported. In 1890 vast fields of ice and enormous icebergs were reported over and near the Grand Banks north of the 43d parallel.

FOG IN JANUARY.

The limits of fog-belts west of the 40th meridian, as determined from reports of shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on 5 dates; between the 55th and 65th meridians on 6 dates; and west of the 65th meridian on 2 dates. Compared with the corresponding month of the last 3 years the dates of occurrence of fog near the Grand Banks numbered the same as the average; between the 55th and 65th meridians 4 less than the average; and west of the 65th meridian 7 less than the average. On the dates fog was reported east of the 55th

meridian it occurred with the approach of general storms from the westward. On the dates fog was reported west of the 55th meridian it occurred with the approach or passage to the northward of general storms. On the 1st, 2d, 11th, 12th, 17th, 18th, 24th, and 29th, dense fog was reported at points along the New England, New York, and New Jersey coasts with the approach of general storms. On the 1st marine traffic was almost entirely suspended in the afternoon at Baltimore, Md., by dense fog. Dense fog prevailed at New York City on the 1st and 2d, and navigation and traffic on railroads were almost entirely suspended. Dense fog prevailed at New Haven, Conn., on the 2d, delaying or stopping New York boats. On these dates a general storm of marked energy advanced from the middle Mississippi valley to east New England.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for January, 1891, is exhibited on Chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was lowest over south Florida and in the extreme lower Rio Grande valley, where it was above 60, and the mean readings were above 50 along the Gulf coast, along the Atlantic coast south of Charleston, S. C., in southwest Arizona and south California, and along the immediate Pacific coast south of the 40th parallel. The mean temperature was lowest in Manitoba, north Ontario, and in the lower Saint Lawrence valley, where it was below 10; the mean was also below 10 at elevated stations in Colorado. The mean values were below 20 north of a line traced from the southwest coast of the Gulf of Saint Lawrence south of west to north Vermont, thence irregularly westward to south Minnesota, and thence northwest over the British Possessions north of Montana, and in areas in the middle and east plateau regions.

The mean temperature was above the normal, except in the east Gulf states and Florida, and in the southern and the west parts of the middle plateau regions. The greatest departure above the normal occurred in north-central Montana and the British Possessions to the northward, where it exceeded 20, and the departure was more than 10 from east Washington to the upper Mississippi valley and the west part of the upper lake region. The most marked departure below the normal was noted in the southeast plateau region and at Key West, Fla., where it equalled or exceeded 4.

From the north Pacific coast to the Red River of the North Valley the current month was the warmest January on record, the mean temperature varying from 5 above the normal on the north Pacific coast to more than 20 above the normal in Montana and North Dakota. The warmest January along the middle and south Atlantic and east Gulf coasts occurred in 1890, when the mean temperature was 9 to 14 above the normal in those districts; over the middle plateau in 1887, when the mean temperature was 3 to 5 above the normal; and from the middle and southern plateau regions northeast and east, save along the Atlantic coast south of New England and on the east Gulf coast, in 1880, when the mean temperature was 12 to 14 above the normal in east Texas, 14 to 18 above in the Mississippi Valley, and 12 to 16 above in the Lake region; in New England the warmest January was noted in 1880 and 1889, when the mean temperature was 8 to 12 above the normal.

At Fort Grant, Ariz., 13 years record, and at Montrose, Colo., 6 years record, the current month was the coldest January on record, the mean temperature being 3 below the normal at Fort Grant, and 6 below at Montrose. At stations on the middle and south Pacific coasts and in the west part of the middle plateau the coldest January was noted in 1890, when the mean temperature was 4 to 6 below the normal on the California coast, and 8 below the normal at Winnemucca, Nev.; in New England, and from the north Pacific coast to central Montana, in 1888, when the mean temperature was 5 to 7 below the normal in New England, and 4 to 10 below the normal from west Montana to the north Pacific coast; from the southeast slope of the Rocky Mountains to the Atlantic coast between the 33d and 39th parallels in 1886, when the mean temperature was 5 to 8 below the normal in that region; in the lower Rio Grande valley in 1881, when the mean temperature was 6 to 8 below the normal; in the Lake region and thence to the New Jersey coast, and from the Missouri Valley over the middle-eastern slope of the Rocky Mountains, in 1875, when the mean temperature was 6 to 10 below the normal in the Lake region, 5 to 8 below in New Jersey and Pennsylvania, and 10 to 12 below in the middle Missouri valley and on the middle-eastern slope of the Rocky Mountains.

In January, 1891, when the mean temperature was the highest on record for that month over the northwest part of the country, it was the lowest ever reported at stations in the south part of the plateau region. In 1890, when the warmest January on record was noted on the middle Atlantic and east Gulf coasts, the month was the coolest January reported at stations on the middle and south Pacific coasts.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for January for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for January, 1891; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for January, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1891.	(4) Departure from normal.	(5) Extreme monthly mean for Jan.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	*Years*	°	°	°		°	
Lead Hill	Boone	33.1	9	38.3	+ 5.2	45.6	1890	24.2	1886
California.									
Sacramento	Sacramento	46.5	25	41.0	— 5.5	52.7	1873	38.4	1890
Connecticut.									
Middletown	Middlesex	24.9	23	29.0	+ 4.1	33.7	1890	17.3	1888
Florida.									
Merritt's Island	Brevard	62.9	9	59.5	— 3.4	69.8	1882	55.4	1886
Georgia.									
Forsyth	Monroe	48.2	17	48.8	+ 0.6	59.4	1880	40.8	1884
Illinois.									
Peoria	Peoria	24.4	35	32.2	+ 7.8	40.9	1880	13.5	1857
Riley	McHenry	17.8	35	25.8	+ 8.0	33.2	1880	5.5	1875
Indiana.									
Vevay	Switzerland	31.2	25	36.4	+ 5.2	47.2	1880	23.0	1884
Iowa.									
Cresco	Howard	9.1	19	22.4	+13.3	26.1	1880	— 1.3	1883
Monticello	Jones	16.1	22	25.6	+ 9.5	32.9	1880	6.0	1883
Logan	Harrison	18.0	17	30.2	+12.2	34.4	1880	7.1	1886
Kansas.									
Lawrence	Douglas	26.5	28	32.4	+ 5.9	41.2	1880	14.3	1886
Wellington	Sumner	25.0	12	36.1	+11.1	40.4	1880	17.6	1886
Louisiana.									
Grand Coteau	Saint Landry	52.6	8	50.2	— 2.4	64.0	1890	47.4	1886
Maine.									
Orono	Penobscot	15.0	17	21.0	+ 6.0	24.7	1889	8.2	1875
Maryland.									
Cumberland	Allegany	29.9	32	33.2	+ 3.3	40.7	1890	19.6	1865, '67